

Acculturation, Race/Ethnicity, and Health Behaviors

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Abstract

Our study aim was to test whether three commonly-used measures of acculturation, or simple race and ethnicity, were more accurate in predicting three specific health behaviors. “Acculturation” variables included a) citizenship status (native-born US citizen, naturalized citizen, non-citizen), b) years of residence in the USA, and c) language spoken during the interview, and that reported to be spoken at home. The health behaviors examined were a) receiving an annual flu vaccination, b) current smoker or “never having smoked” status, and c) (not) drinking more than four alcoholic beverages at one time on a daily or weekly basis (“binge drinking”).

Data from the 2011 – 2019 California Health Interview Surveys (CHIS) indicate that Asian race was a positive predictor of all three health behaviors. Whites, Hispanics and African-Americans demonstrated similar positive behaviors, but specifically in regards to flu vaccinations, never having smoked status, and (no) binge drinking, respectively. Bivariate and logistic regression analyses indicate that citizenship status, and years of residency in the USA for non-citizens, did not predict these same behaviors.

Findings indicate that language may be significant, but mainly as a proxy for race and ethnicity, rather than as an acculturation component. Responses from those who spoke Spanish or an Asian language offered in CHIS, for example, were largely consistent with those from Hispanic and Asian participants, respectively. Responses to the same questions from those who spoke an Asian language a) during the interview and b) reportedly at home, were not always consistent, however, and warrant further investigation.

It is also possible that the relatively small number of CHIS survey language choices may limit diversity and representation in the study population, and affect findings using these data. Those who do not speak English, Spanish, Chinese (Cantonese and Mandarin), Korean, Tagalog or Vietnamese are presumably excluded from this study, although their data in terms of language, race and ethnicity would seem highly relevant and valuable. Because CHIS is limited to California, we recommend future research using nationwide data that considers other acculturation components, and includes ethnic and cultural subgroups, and bi- and multi-racial populations.

Keywords: Acculturation, immigrant, health behaviors, race, ethnicity, CHIS, language

INTRODUCTION

Acculturation may be summarized as changes that result from contact between groups or individuals, and others of different cultural backgrounds [1]. These are thought to be affected by years of residence in the new country, fluency in the language of the dominant culture, attitudes and behaviors determined or influenced through contact with the established population

and institutions, and other factors or stressors [2,3]. Models and research are sometimes applied in healthcare, as in matching patients to providers based on levels of acculturation [4]. However, acculturation assessments can be inconsistent due to wide variation and differences in instrumentation [5,6]. The literature, in fact, reveals no universal consensus on which surveys, questionnaires, components, domains and criteria best measure and assess acculturation, and its effects on groups,

subgroups, and individuals. Other concerns include the lack of a robust theoretical foundation, and when assessment is done primarily through linguistic elements [7].

In this study, we test whether three simple measures of acculturation, as opposed to race and ethnicity, are more accurate in predicting certain specific health behaviors. These include a) having had an annual flu vaccination, b) (not) consuming more than four alcoholic drinks at a time on a daily or weekly basis, and c) smoking status as current smoker, or never having smoked regularly. Findings are intended to inform healthcare providers, policy makers, and future research, and to lead to more effective treatment and outreach, especially for underserved, immigrant, and minority populations.

BACKGROUND

Acculturation, Health Behaviors and Outcomes

Acculturation constructs, strategies and models do not seem optimal in predicting specific health behaviors such as a “junk food” diet, or outcomes such as obesity, diabetes or heart disease, especially among different ethnic subgroups in the USA and in other parts of the world [8]. Socioeconomic status, environment, and other, less complicated factors may be more significant. Samoans, for example, are thought to now suffer more from obesity because many have moved from rural towns and villages to urban areas, where junk food, and high calorie and high fat items are more available and affordable [9]. Moreover, simple genetics such as Polynesian ancestry can predispose individuals to obesity and related health conditions [10].

Assessing acculturation in itself may also be inherently biased, if we assume that groups or individuals can or wish to pursue integration and assimilation strategies. The Māori of New Zealand, for example, report discrimination in housing based on their appearance, suggesting that they are not easily integrated, much less assimilated [10]. In addition, certain groups may willingly and consciously pursue psychological and physical separation strategies. Examples include an *eruv* [11] for observant Jews, and ethnic neighborhoods such as Little Ethiopia in Los Angeles.

Race/Ethnicity, Health Behaviors, and Outcomes

The value of using characteristics or demographics to determine the level or degree of acculturation, which are in turn used to predict outcomes or behaviors, seems equivocal. One study found that analyzing the length of residency in a new country to establish the level of acculturation, then using this measurement to determine acculturation's effect on coronary vascular disease (CVD), was unnecessarily complicated and prone to inaccuracies [12]. Adverse outcomes and disease may even be better explained through genetics, and customs and traditions such as feasting and large body ideation, rather than through acculturative stress, or through negative interaction with other cultures. Factors such as a genetic predisposition, obesity, smoking, excess drinking, the lack of exercise, and a high-fat diet may more accurately predict conditions such as CVD and other health conditions [13-16].

The most important wellness components may, in fact, be voluntary compliance and preventative health behaviors, which

in turn are possibly associated with race and ethnicity, rather than acculturation. One study, in fact, found a direct relationship between Asian ethnicity and influenza vaccination uptake in California adults, but none between commonly used acculturation measures and vaccination [17]. Race and ethnicity appear fundamental even in assessing acculturation, as evidenced in the *Short Acculturation Scale* tailored for Mexican-American, Hispanic, and Filipino populations [18-20]. Our preliminary review of the literature identified 37 separate acculturation instruments designed for specific racial and ethnic populations, e. g. White Americans, Puerto Rican Americans, and African Americans/African immigrants [4,21].

Common Measures of Acculturation

Common acculturation measures include components as diverse as food preferences, cultural identity, and even gender [22]. African-American acculturation measurements include traditional beliefs and practices, family structure, and the preparation and consumption of traditional foods [23]. For Asian Americans, cultural identity and knowledge, language use, and food preferences are thought relevant [24]. For Latinos, cultural and social knowledge, behaviors and attitudes based on length of time in the United States, place of birth, and language and media preferences are seen as significant [21]. Language use and/or proficiency, however, appear to be the most commonly-used acculturation components, found in 16 out of 37 instruments in our review of the literature. In addition, the number of years lived in the USA, and citizenship status, have frequently been used as indicators or proxies of acculturation and assimilation [25-29].

Study Aim/Objectives

We use data from years 2011-2019 of the *California Health Interview Survey* (CHIS) to test whether three commonly-used measures of acculturation are more accurate in predicting three voluntary health behaviors, as opposed to race and ethnicity.

Research Question

Using data from the California Health Interview Survey (CHIS), do three commonly-used acculturation measures predict three specific health behaviors more accurately than simple race and ethnicity?

METHODS

The California Health Interview Survey (CHIS)

Conducted in English, Spanish, Chinese (Cantonese and Mandarin), Korean, Tagalog and Vietnamese, CHIS is the largest state health survey in the nation, providing population-based estimates for civilian and non-institutionalized residents of California (<https://healthpolicy.ucla.edu/CHIS>). CHIS surveys on a wide range of health topics, collecting representative data from all 58 counties in California. Conducted on a continuous basis, CHIS provides ongoing one-year estimates.

To ensure consistency, we examined data from the 2011 through 2019 surveys inclusive, prior to the implementation of a new web- and telephone-based survey methodology. Our data were collected from a total of 179,754 men and women, 18 years of age and older. The CHIS variables used in this study are detailed in Table 1.

Table 1: Study variables from CHIS

Variable	Value	Weighted %
Race/ethnicity		
Non-Hispanic White	115018	42.2
Non-Hispanic African American	9064	5.6
Hispanic	41296	35.1
Non-Hispanic Asian	17718	14.3
Other	6658	2.8
Citizenship		
US-born	146027	66.8
Naturalized citizen	27507	17.9
Non-citizen	16220	15.3
Years in USA		
Since born	146027	66.8
<5 years	2078	2.2
5-9 years	2861	3.0
10-14 years	4395	4.1
15+ years	34393	23.9
Language used in interview		
English	152923	84.4
Spanish	13235	13.0
Non-English	4080	2.6
Language used at home		
English	132905	55.4
Non-English	10004	6.6
Spanish	10747	9.3
Flu vaccination		
Yes	52668	40.0
No	51872	60.0
Smoking		
Currently smokes	20069	11.7
Quit smoking	54547	22.0
Never smoked regularly	115138	66.3
Consumes > 4 alcoholic drinks at a time		
Non-drinker	79537	67.7
Yearly	14839	19.4
Monthly	6624	9.0
Daily-weekly	3209	3.9

Independent Variables

The language used during the interview process, and that spoken at home, coded as a) English, b) Spanish, or c) non-English, were used as independent variables. It is important to note that “non-English” and “neither English nor Spanish” as used in this manuscript means Chinese (Cantonese or Mandarin), Korean, Tagalog or Vietnamese. Other variables of interest included the respondent’s race and ethnicity, citizenship status (US-born citizen, naturalized citizen, or non-citizen), and the number of

years lived in the USA. The latter identifies citizens as US-born, and groups non-citizens’ length of residence as less than five years, five to nine years, 10 to 14 years, and 15 or more years.

Dependent Variables

Our dependent variables are among many thought to represent positive voluntary health behaviors. They include a) having had an annual flu vaccination, b) (not) consuming more than four alcoholic drinks at a time on a daily or weekly basis, and c) smoking status as a current smoker, or never having smoked regularly.

Methods

We used the *Statistical Analysis Software (SAS)* program (version 9.3, Cary, NC; https://www.sas.com/en_us/software/stat.html) for our analyses. Univariate and descriptive statistics were used for distributions of the study variables. Demographic characteristics, and acculturation and health behavior variables were analyzed using chi-square tests. We used multiple logistic regression analysis for health behaviors outcomes. In all cases, $p < 0.05$ was considered statistically significant. Results are presented in Tables 2 and 3.

Limitations

The authors recognize that our “health” variables, e. g. non-smoker status and having had an annual flu vaccination, are a very small subset of many positive, voluntary behaviors. However, our practical goal was to test the strength of race and ethnicity, as opposed to certain common components of acculturation found in the literature, in predicting three intuitively beneficial behaviors. In this study, we did not differentiate responses based on gender or age group. We also did not include responses from self-identified Native American/American Indian, or bi- and multi-racial respondents due to their small sample sizes. However, we have strongly advocated for the latter’s routine inclusion in research [10].

From a methodological perspective, African American participants may be underrepresented at a weighted percentage of only 5.6% of the study population, compared to 42.2% who were White, 35.1% who were Hispanic, and 14.3% who identified as Asian (Table 1). We also did not include data captured during the CHIS interviews in which both English and non-English was spoken. These were omitted because of uncertainty over exactly which non-English language(s) were used, to what extent they were used, and under what circumstances, conditions and contexts.

CHIS is a self-reported survey which is subject to self-selection, recall, observation, and other bias. Data is collected from individuals and families living in the State of California, and findings are not generalizable to other states, or to the entire nation. CHIS was redesigned for the 2019-2020 survey. As a result, we have limited our analyses to data collected between 2011 and 2019 to ensure consistency.

FINDINGS

Results

Bivariate analysis revealed that a large percentage of Asians had

an annual flu vaccination (43.9%), and were most likely to have never smoked regularly (78.2%). They were also the least likely to have more than four drinks at a time on a daily or weekly basis (4.8%). White, Hispanic and African-American respondents demonstrated similar healthy behaviors, but specifically in regards to flu vaccinations (44.5%), never having smoked regularly (72.7%), and binge drinking (5.5%), respectively (Tables 2a – 2c).

Logistic regression analysis revealed that Asians and Hispanics were about 51% ($p = <0.0001$) and 37% ($p = <0.0001$) less likely

than Whites respectively to have ever been regular smokers (Table 3a). There was no statistically significant difference ($p = 0.1786$) between African-Americans and Whites in this regard (Table 3a), and relatively little difference between a) native-born citizens (63.4% as likely), b) naturalized citizens (72.5% as likely), and c) non-citizens (72.1% as likely) in bivariate analysis (Table 2b). Non-citizens (11.4%) were about as likely as US-born citizens (12.6%) to be current smokers. Between 70.7% and 76.3% of all non-citizens have never been regular smokers, compared to 63.4% of US-born citizens (Table 2b).

Table 2a: Bivariate results for annual flu vaccination

Variable	Received flu vaccination n (weighted %)	No flu vaccination n (weighted %)	p-value
Race/ethnicity			
Non-Hispanic White	33417 (44.5%)	28439 (55.5%)	<0.0001
Non-Hispanic African American	2068 (33.0%)	2969 (67.0%)	
Hispanic	9751 (34.5%)	13833 (65.5%)	
Non-Hispanic Asian	5892 (43.9%)	4683 (56.1%)	
Citizenship			
US Born	40052 (40.2%)	38204 (59.8%)	<0.0001
Naturalized citizen	8711 (46.6%)	7272 (53.4%)	
Non-citizen	3905 (32.3%)	6396 (67.7%)	
Years in US			
Since born	40052 (40.2%)	38204 (59.8%)	<0.0001
<5 years	425 (33.9%)	763 (66.1%)	
5-9 years	642 (29.9%)	1136 (70.1%)	
10-14 years	1014 (28.9%)	1903 (71.1%)	
15+ years	10535 (43.7%)	9866 (56.3%)	
Language used in interview			
English	36363 (39.2%)	37934 (60.8%)	<0.0001
Spanish	3495 (36.9%)	4686 (63.1%)	
Non-English	1644 (54.3%)	902 (45.7%)	
Language used at home			
English	37406 (42.3%)	33686 (57.7%)	<0.0001
Non-English	3219 (42.6%)	2730 (56.4%)	
Spanish	2957 (37.2%)	3850 (62.8%)	

Table 2b: Bivariate results for smoking status

Variable	Currently smokes n (weighted %)	Never smoked regularly n (weighted %)	p-value
Race/ethnicity			
Non-Hispanic White	12166 (12.6%)	63291 (58.2%)	<0.0001
Non-Hispanic African American	1427 (17.1%)	5316 (62.7%)	
Hispanic	3981 (10.5%)	29569 (72.7%)	
Non-Hispanic Asian	1123 (8.1%)	13659 (78.2%)	
Citizenship			
US Born	16523 (12.6%)	83942 (63.4%)	<0.0001
Naturalized citizen	1881 (8.3%)	19442 (72.5%)	
Non-citizen	1665 (11.4%)	11754 (72.1%)	

Years in US			
Since born	16523 (12.6%)	83942 (63.4%)	
<5 years	207 (11.8%)	1595 (76.3%)	<0.0001
5-9 years	245 (10.1%)	2234 (77.6%)	
10-14 years	377 (9.8%)	3416 (75.8%)	
15+ years	2717 (9.5%)	23951 (70.7%)	
Language used in interview			
English	16749 (11.9%)	90716 (65.3%)	<0.0001
Spanish	1152 (10.0%)	9760 (71.8%)	
Non-English	323 (11.2%)	3076 (74.4%)	
Language used at home			
English	14894 (12.8%)	74482 (60.7%)	<0.0001
Non-English	898 (10.5%)	7202 (74.2%)	
Spanish	882 (9.5%)	8089 (74.1%)	

Table 2c: Bivariate results for binge drinking

Variable	Daily-Weekly n (weighted %)	Does not drink n (weighted %)	p-value
Race/ethnicity			
Non-Hispanic White	4663(11.2%)	48752 (65.8%)	<0.0001
Non-Hispanic African American	196 (5.5%)	4055 (74.5%)	
Hispanic	1412 (8.4%)	16161 (65.1%)	
Non-Hispanic Asian	255 (4.8%)	8089 (78.4%)	
Citizenship			
US Born	5884 (11.2%)	59255 (64.0%)	<0.0001
Naturalized citizen	508 (4.6%)	12929 (78.6%)	
Non-citizen	449 (5.5%)	7353 (70.9%)	
Years in US			
Since born	5884 (11.2%)	59255 (64.0%)	<0.0001
<5 years	65 (3.8%)	766 (74.6%)	
5-9 years	64 (4.6%)	1373 (75.7%)	
10-14 years	108 (4.3%)	2249 (75.3%)	
15+ years	720 (5.3%)	15894 (74.8%)	
Language used in interview			
English	5465 (10.1%)	56170 (66.4%)	<0.0001
Spanish	247 (4.0%)	5959 (72.8%)	
Non-English	38 (2.2%)	2020 (88.9%)	
Language used at home			
English	5252 (10.7%)	55200 (65.5%)	<0.0001
Non-English	180 (5.3%)	4751 (81.1%)	
Spanish	208 (4.1%)	5183 (73.8%)	

Of those who spoke English a) at home and b) in the CHIS interview, 60.7% and 65.3% respectively said they had never smoked regularly. In contrast, about 72-74% of those who spoke Spanish, and about 74% of those who spoke “Non-English” (or in effect, an Asian language) in both the interview and at home, said they were never regular smokers (Table 2b). In logistic regression analysis, those who spoke Spanish at home were 32% less likely ($p = 0.0023$) than those who spoke English at

home to have been smokers. There was no significant difference ($p = 0.273$) between those who spoke Spanish in the interview compared to those who spoke English (Table 3a). Logistic regression analysis also revealed no significant difference between Hispanics and Whites in terms of receiving an annual flu vaccination ($p = 0.0577$). However, African-Americans were about 30% less likely than Whites to be vaccinated ($p < 0.0001$), while Asians were about 28% more likely ($p = 0.0009$) (Table 3b).

About 47% of naturalized and 40% of native-born citizens received an annual flu vaccination, compared to about 32% of non-citizens (Table 2a). Approximately 29-34% of non-citizens who had resided for less than 15 years in the USA had an annual flu vaccination, compared to almost 44% of non-citizens who had resided in the country for 15 years or more (Table 2a). For non-citizens, there was no statistically significant difference in vaccination rates in groupings of number of years of residence in the USA ($p = 0.05159 - p = 0.9142$) (Table 3b).

About 37% of respondents who spoke Spanish, and 39-42% of those who spoke English during the CHIS interview and at home, received an annual flu vaccination. Of those who said they spoke an Asian language at home, 37.2% received an annual vaccination. However, 54.3% of those who spoke an Asian language *in the interview* received an annual vaccination (Table 2a). In logistic regression analysis, we found no significant difference in vaccination status between those who spoke a) Spanish ($p = 0.2668$) or an Asian language ($p = 0.4743$), and b) English (ref) at home. However, those who spoke Spanish at home were 27% more likely ($p = 0.0045$) than those who spoke English at home to receive a flu vaccination (Table 3b).

Logistic regression analysis revealed that Asians ($p = 0.0001$), Hispanics ($p = 0.0106$), and African-Americans ($p = 0.0001$) were 61%, 18% and 51% less likely than Whites to binge drink on a

daily or weekly basis, respectively (Table 3c). Roughly 11% of US-born citizens consumed over four drinks at a time on a daily or weekly basis, compared to between 4% and 6% of naturalized and non-citizens. Between 3.8% and 5.3% of non-citizens in all years of residency groupings reported binge drinking on a daily or weekly basis, compared to 11.2% of all US-born citizens (Table 2c). Non-citizens in all residency groupings were less likely ($p = <0.0001 - p = 0.0013$) than native-born citizens to binge drink (Table 3c). Rates ranged from 69% less likely (less than five years in the USA) to 27% less likely (15+ years in the USA).

About 10% of those who spoke English during the interview and at home reported having more than four drinks at a time on a daily or weekly basis. About 4% of those who spoke Spanish at home and in the interview consumed as much. Only 2.2% of those who spoke an Asian language *in the interview* were binge drinkers. However, 5.3% of those who reported speaking an Asian language *at home* consumed more than four drinks at a time daily or weekly (Table 2c). Logistic regression analysis revealed that those who spoke Spanish in the interview were 40% less likely than those who spoke English to binge drink ($p = 0.0064$). However, there was no significant statistical difference between those who spoke English (ref) and a) neither Spanish nor English in the interview ($p = 0.9642$) or at home ($p = 0.1369$), or b) Spanish at home ($p = 0.2993$) in regards to binge drinking (Table 3c).

Table 3a: Logistic regression of smoking status

Variable	Currently smokes vs. Never smoked	
	OR (95% CI)	p-value
Race/ethnicity		
Non-Hispanic White	Ref	
Non-Hispanic African American	1.11 (0.95-1.29)	0.1786
Hispanic	0.63 (0.54-0.73)	<0.0001
Non-Hispanic Asian	0.49 (0.41-0.58)	<0.0001
Years in USA		
Since born	Ref	
<5 years	0.99 (0.74-1.34)	0.9668
5-9 years	0.89 (0.66-1.21)	0.4695
10-14 years	0.89 (0.67-1.17)	0.4006
15+ years	0.96 (0.84-1.10)	0.5613
Language used in interview		
English	Ref	
Spanish	0.89 (0.72-1.10)	0.2730
Non-English	1.54 (1.12-2.13)	0.0088
Language used at home		
English	Ref	
Non-English	0.80 (0.65-0.98)	0.0321
Spanish	0.68 (0.53-0.87)	0.0023

Table 3b: Logistic regression of receiving annual flu vaccination

Variable	OR (95% CI)	p-value
Race/ethnicity		
Non-Hispanic White	Ref	
Non-Hispanic African American	0.70 (0.61-0.81)	<0.0001
Hispanic	0.91 (0.83-1.00)	0.0577
Non-Hispanic Asian	1.28 (1.11-1.48)	0.0009
Years in USA		
Since born	Ref	
<5 years	1.11 (0.81-1.51)	0.5159
5-9 years	0.87 (0.69-1.10)	0.2341
10-14 years	0.79 (0.62-1.01)	0.0558
15+ years	1.01 (0.90-1.12)	0.9142
Language used in interview		
English	Ref	
Spanish	1.27 (1.08-1.49)	0.0045
Non-English	1.19 (0.89-1.58)	0.2449
Language used at home		
English	Ref	
Non-English	0.93 (0.75-1.14)	0.4743
Spanish	1.13 (0.91-1.40)	0.2668

Table 3c: Logistic regression of binge drinking

Variable	> 4 drinks at a time daily or weekly vs. non drinker	p-value
Race/ethnicity		
Non-Hispanic White	Ref	
Non-Hispanic African American	0.49 (0.38-0.63)	<0.0001
Hispanic	0.82 (0.70-0.95)	0.0106
Non-Hispanic Asian	0.39 (0.31-0.50)	<0.0001
Years in USA		
Since born	Ref	
<5 years	0.31 (0.17-0.56)	<0.0001
5-9 years	0.36 (0.21-0.62)	0.0002
10-14 years	0.39 (0.26-0.58)	<0.0001
15+ years	0.73 (0.61-0.89)	0.0013
Language used in interview		
English	Ref	
Spanish	0.60 (0.41-0.86)	0.0064
Non-English	0.98 (0.49-1.98)	0.9642
Language used at home		
English	Ref	
Non-English	0.79 (0.58-1.08)	0.1369
Spanish	0.82 (0.56-1.20)	0.2993

DISCUSSION

Our review of the literature and findings suggest the limitations and constraints of using language in predicting health behaviors and outcomes, and in assessing acculturation. In one Korean-American study, the authors identified ethnic group variation, highly divergent health relationships and their relative effect, biculturalism and other, multi-dimensional health relationships as relevant factors in Korean-American health, rather than language use [30].

Language may also compromise the diversity, distribution and relevance of CHIS data. Because it is conducted only in English, Spanish and a relatively small number of Asian languages, the study population is limited. Findings using CHIS data are thereby constrained, and certainly non-generalizable. CHIS will not contain responses from White participants who speak only Russian, or Asians who speak only Japanese. They will be excluded from the survey, although their data as representative of language spoken, race and ethnicity may be highly relevant and valuable.

In CHIS, language may also serve as a proxy for race. Because CHIS was conducted in English, Spanish, Chinese (Mandarin and Cantonese), Korean, Tagalog and Vietnamese, “neither English nor Spanish” in effect indicates probable Asian race and ethnicity. It is therefore not surprising that we found responses in “non-English” and Spanish to be generally consistent with those from Asians and Hispanics. For example, about 72% who spoke Spanish, and 74% of those who spoke “non-English” in the CHIS interview said that they never smoked regularly. This is

consistent with the approximately 72% of Hispanics and 78% of Asians who said they were never regular smokers. The variance in responses from the latter group (74% v. 78%) may perhaps be attributed to those who identified as Asian, and spoke English in the interview.

It is interesting that responses from Asian language speakers differed depending on setting. Only 2.2% of those who spoke “Non-English” *in the interview* reported having more than four drinks at a time on a daily or weekly basis. However, 5.3% of those who said that they spoke “Non-English” *at home* said they consumed as much. This contrasts to the almost identical rates of self-reported binge drinking among those who spoke a) English (about 10%) and b) Spanish (about 4%) both at home and in the interview. In regards to current smoker status, responses were generally consistent regardless of language spoken during the interview, and that reportedly spoken at home.

The variance in binge drinking responses may result from observation bias during the interview process. Participants who say they spoke an Asian language at home may have been less inclined to admit to a “very bad” habit (binge drinking) as opposed to a relatively minor one, such as smoking, for which “interview” and “at home” responses were generally consistent. However, this does not explain the difference in regards to binge drinking from those who spoke an Asian language during the interview, and responses from those who said that they spoke an Asian language at home. It is also unclear how or why observation bias would affect “good” behaviors such as receiving a flu vaccination. Over 54% of Asian language respondents reported receiving a vaccination in the interview, compared to just over 42% of those who said they spoke an Asian language at home. This contrasts with responses from those who spoke English and Spanish both in the interview and at home, which were generally consistent in regards to flu vaccination, smoking status and binge drinking.

Citizenship status appears to have an uneven effect, if any, on our three health behaviors. Roughly 11 - 13% of native-born US citizens and non-citizens smoke, compared to about 8% of naturalized citizens. However, over 46% of naturalized citizens have had an annual flu vaccination, compared to about 40% of native-born citizens and 32% of non-citizens. Over 11% of US-born citizens have over four drinks at a time on a daily or weekly basis, compared to about 5% of naturalized and 6% of non-citizens. Observation bias may again be a factor in that naturalized and non-citizens may be more reluctant than native-born citizens to admit to “bad habits” such as smoking or binge drinking.

Unlike language, citizenship status does not appear to be a proxy for race and ethnicity. Clearly, many Hispanic, Asian and “Other” respondents were born in the USA. Obvious factors that can influence health behaviors in native-born, naturalized, and non-citizens include environment, socioeconomic status, and access to resources and care. Years of residence in the USA for non-citizens were not significant predictors of our selected health behaviors. Results seem more easily attributable to age and maturity, rather than to time spent in the USA, or acculturation, integration or assimilation.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Our study aim was to determine whether three common measures of acculturation, as opposed to race and ethnicity, were more accurate in predicting three specific health behaviors. Findings indicate that being Asian was both a significant and consistent positive predictor. Whites, Hispanics and African-Americans demonstrated similar behaviors, but specifically in regards to flu vaccinations, smoking status, and binge drinking, respectively. Citizenship status and years of residence in the USA were not consistent predictors of our “healthy” behaviors.

Findings suggest that language may be a significant factor in CHIS design and in data analysis. Because the survey is offered only in English, Spanish and a relatively small number of Asian languages, the study population is limited, and findings may therefore be constrained and equivocal. Those who speak only Russian, Armenian, Japanese or Thai, for example, are presumably excluded from the survey, although their data as representative of language spoken, and race and ethnicity, seem highly relevant and valuable.

Language, in fact, appears significant in our study not as an acculturation measure, but as a proxy for race and ethnicity. Responses from those who spoke Spanish or an Asian language in the CHIS interview, for example, were generally consistent with those from Hispanics and Asians. The reasons for the differences in responses collected during interviews in an Asian language, as opposed to those collected from those who said they spoke an Asian language at home, are unclear, and warrant further investigation.

Because CHIS data is limited to California, we also recommend future research using regional or national resources. This should test race and ethnicity against other commonly used acculturation components in predicting other health behaviors, and even health outcomes. Future studies should also include cultural and ethnic subgroups, as well as bi- and multi-racial populations.

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